CLAIMS:

What is claimed is:

1. An encoder system comprising:

an encoder for generating an encoder signal indicative of linear movement of a moving workpiece traveling along a path;

a first sensor positioned along the path traveled by the workpiece, the first sensor generating a first sensor signal in response to sensing an identifying characteristic of the workpiece;

a second sensor positioned along the path traveled by the workpiece, the second sensor generating a second sensor signal in response to sensing the identifying characteristic of the workpiece, said second sensor being positioned a known distance from the first sensor along the path traveled by the workpiece; and

a processor for determining the encoder resolution as a function of the encoder signal, the first sensor signal, the second sensor signal, and the known distance between the first and second sensors.

2. The system of claim 1 wherein the encoder comprises an encoder wheel for generating the encoder signal, said encoder wheel engaging the moving workpiece and rotating as the workpiece travels along the path, the encoder signal comprising pulses indicative of the linear movement of the workpiece generated by the rotary encoder wheel.

3. The system of claim 1, further comprising a mounting block on which the first sensor and the second sensor are mounted.

4. The system of claim 1, further comprising:

a temperature sensor sensing a temperature of a material on which the first sensor and second sensor are mounted, wherein the processor is configured to determine an adjusted known distance and the encoder resolution as a function of the

sensed temperature and a coefficient of expansion of the material on which the first and second sensors are mounted.

5. The system of claim 1 wherein encoder signal comprises a plurality of pulses, and wherein the processor determines a first encoder count as a function of a first encoder signal pulse corresponding to the first sensor signal and determines a second encoder count as a function of a second encoder signal pulse corresponding to the second sensor signal, the processor determining the encoder resolution as a function of the first encoder count, the second encoder count, and the known distance.

6. The system of claim 5, further comprising a high speed timing circuit generating a timing signal, said processor receiving the timing signal and determining a fractional portion of the first encoder count and a fractional portion of the second encoder count based on the received timing signal, said processor further determining the encoder resolution as a function of the fractional first encoder count, the fractional second encoder count, and the known distance.

7. The system of claim 1 wherein the encoder resolution is determined as a function of a fractional portion of a first encoder count ef1 and a fractional portion of the second encoder count ef2, the first encoder count ef1 and the second encoder count ef2 being determined as follows:

$ef1 = 2 * (ts1/te1)$ and
$ef2 = 2 * (ts2/te2)$

where te1 is a timing width of a first encoder signal pulse, te2 is a timing width of a second encoder signal pulse, ts1 is a timing period from start of the first encoder signal pulse to the generating of the first sensor signal, and ts2 is a timing period from the start of the second encoder signal pulse to the generating of the second sensor signal.

8. The system of claim 1 wherein the first and second sensors are selected from the following group of sensors: optical, video, laser, LED, fiber optic, radiographic, ultrasonic, infrared, and electromagnetic wave.

9. The system of claim 1 wherein the first and second sensors comprise LED sensors, each having an emitter and a receiver, the emitter and receiver of each of the first and second LED sensors being positioned on opposite sides of the path of the moving workpiece.

10. The system of claim 1 wherein the identifying characteristic comprises a physical characteristic of the workpiece.

11. The system of claim 1 wherein the identifying characteristic is a leading edge of a first workpiece, said first sensor further generating a second first sensor signal in response to sensing a second leading edge of a second workpiece, the processor determining a length of the workpiece as a function of the encoder signal, the first sensor signal, the second first sensor signal, and the determined encoder resolution.

12. The system of claim 1 wherein the identifying characteristic is a hole in a workpiece, said first sensor further generating a second first sensor signal in response to a second sensing of the identifying characteristic, the processor determining a length as a function of the encoder signal, the first sensor signal, the second first sensor signal, and the determined encoder resolution.

13. The system of claim 1, further comprising a production line controller receiving a production parameter, said production line controller being responsive to a production parameter for determining a production line encoder resolution.

14. The system of claim 13 wherein the production line controller is selected from the following group: a roll forming controller, a cut-to-length controller, and an extrusion line controller.

15. The system of claim 13 wherein the production parameter is selected from the following group: a length of the workpiece, a length between two identifying characteristics, the encoder signal, and the encoder resolution.

16. The system of claim 1 wherein the identifying characteristic is a leading edge, further comprising a third sensor positioned in a second known distance from the first sensor, the third sensor being positioned on an opposite side of the first sensor from the second sensor, the encoder being positioned between the third sensor and the first sensor, said third sensor generating a third sensor signal in response to sensing a trailing edge of the workpiece, wherein the processor determines a length of the workpiece as a function of the encoder signal, the first sensor signal, the third sensor signal, the second known distance, and the determined encoder resolution.

17. A method comprising:

generating an encoder signal indicative of linear movement of a moving workpiece traveling along a path;

generating a first position signal representative of an identifying characteristic of the workpiece reaching a first position along the path traveled by the moving workpiece;

generating a second position signal representative of the identifying characteristic reaching a second position along the path traveled by the moving workpiece, said second position being a known distance from the first position; and

determining encoder resolution as a function of the encoder signal, the first position signal, the second position signal, and the known distance between the first and second positions.

18. The method of claim 17 wherein generating the encoder signal comprises generating electrical pulses with an encoder wheel engaging the moving workpiece and rotating as the workpiece travels along the path.

19. The method of claim 17, further comprising positioning a first sensor at the first position and a second sensor at the second position, the first and second sensors being positioned on a mounting block adjacent the path traveled by the workpiece for generating the first and second position signals, respectively.

20. The method of claim 19, further comprising sensing a temperature of the mounting block, wherein an adjusted known distance and the encoder resolution is determined as a function of the sensed temperature and a coefficient of expansion of the mounting block.

21. The method of claim 17 wherein the encoder signal comprises a plurality of pulses, and determining the encoder resolution comprises:

determining a first encoder count as a function of a first encoder signal pulse corresponding to the first position signal;

determining a second encoder count as a function of a second encoder signal pulse corresponding to the second position signal; and

determining the encoder resolution as a function of the first encoder count, the second encoder count, and the known distance.

22. The method of claim 21, further comprising generating a high speed timing signal, wherein determining the encoder resolution comprises:

determining a fractional portion of the first encoder count as a function of the high-speed timing signal;

determining a fractional portion of the second encoder count as a function of the high speed timing signal; and

determining the encoder resolution as a function of the fractional first encoder count, the fractional second encoder count, and the known distance.

23. The method of claim 17, further comprising determining a fractional portion of a first encoder count ef1 and determining a fractional portion of a second encoder count ef2 as follows:

ef1 = 2 * (ts1/te1); and

ef2 = 2 * (ts2/te2)

where te1 is a timing width of a first encoder signal pulse, te2 is a timing width of a second encoder signal pulse, ts1 is a timing period from start of the first encoder signal pulse to the generating of the first position signal, and ts2 is a timing period from the start of the second encoder signal pulse to the generating of the second position signal.

24. The method of claim 17 wherein generating the first or second position signal comprises sensing by one of the following sensors: optical, LED, video, laser, fiber optic, radiographic, ultrasonic, infrared, and electromagnetic wave.

25. The method of claim 17 wherein generating the first or second position signal comprises determining the identifying characteristic of the workpiece from a first LED sensor and a second LED sensor, each of said first LED sensor and second LED sensor being comprised of an emitter and a receiver, the emitter and receiver of each being positioned on opposite sides of the path of the moving workpiece such that the moving workpiece travels between the emitter and the receiver of each of the first and second LED sensors.

26. The method of claim 17 wherein generating the first or second position signal comprises sensing a presence of a physical characteristic of the workpiece.

27. The method of claim 17, further comprising:

generating a second first position signal representative of a second identifying characteristic of the workpiece reaching the first position along the path traveled by the moving workpiece; and

determining a length as a function of the encoder signal, the first position signal, the second first position signal, and the determined encoder resolution.

28. The method of claim 17 wherein the identifying characteristic is a leading edge of the workpiece, and further comprising:

generating a third position signal representative of a trailing edge of the workpiece reaching a third position a second known distance from the first position; and

determining a length of the moving workpiece as a function of the encoder signal, the first position signal, the third position signal, the second known distance, and the determined encoder resolution.

29. The method of claim 17 further comprising:

generating a third position signal representative of the identifying characteristic reaching a third position along the path traveled by the workpiece, the third position a second known distance from the first position, the encoder being positioned along the path between the third position and the first position; and

determining a length as a function of the encoder signal, the first position signal, the third position signal, the second known distance, and the determined encoder resolution.

30. The method of claim 17, further comprising determining a production line encoder resolution as a function of a production parameter.

31. The method of claim 30, further comprising determining a control command of a production line system as a function of the determined production line encoder resolution.

32. The method of claim 30 wherein the production parameter is selected from the following group: a workpiece length, a length between two identifying characteristics, the encoder signal, and the encoder resolution.

33. A system comprising:

means for generating an encoder signal indicative of linear movement of a moving workpiece traveling along a path;

sensing means for sensing an identifying characteristic of the moving workpiece;

means for determining a first encoder count in response to the sensing of the identifying characteristic by the sensing means at a first location along the path;

means for determining a second encoder count in response to the sensing of the identifying characteristic by the sensing means at a second location along the path; and

means for determining encoder resolution as a function of the first encoder count, the second encoder count, and a known distance between the first and second sensing locations.

34. The system of claim 33, further comprising means for determining a production line encoder resolution as a function of a production parameter.

35. The system of claim 34 wherein the production parameter is selected from the following group: a length of the workpiece, a length between two identifying characteristics, an encoder signal, and the encoder resolution.

36. The system of claim 34 further comprising means for determining a control command for a production line system as a function of a production line encoder resolution and the production parameter.

37. The system of claim 33 wherein the identifying characteristic of the moving workpiece is a leading edge of the workpiece, further comprising:

means for determining a second first encoder count in response to sensing of a leading edge of a second workpiece; and

means for determining a length of the first workpiece as a function of the first encoder count, the second first encoder count, and the encoder resolution.

38. The system of claim 33 wherein the identifying characteristic of the moving workpiece is a hole in the workpiece, further comprising:

means for determining a second first encoder count in response to sensing a second sensing of the hole in the workpiece; and

means for determining a length as a function of the first encoder count, the second first encoder count, and the encoder resolution.